CHAPTER 6
Proposed Minimum Level Criteria, Monitoring, *Significant-Harm* Prevention and Adaptive Management Plan

PROPOSED MINIMUM LEVEL CRITERIA

Definition of *Significant Harm*

The two primary sources of water inputs into Lake Istokpoga are rainfall and inflows from Arbuckle and Josephine creeks. Water levels in Lake Istokpoga are controlled by the operation of water control structures (structures S-68 and G-85) as guided by a regulation schedule adopted by the U.S. Army Corps of Engineers and the SFWMD (**Figure 11**). *Significant harm* stemming from low water levels is unlikely to occur under the existing regulation schedule, given typical regional weather patterns and present levels of inflows from the creeks. According to an analysis of water level requirements (presented in **Chapters 2, 4** and **5)**, *harm* to the resource functions could occur when water levels fall below the 36.5 feet NGVD criterion, which is below the lower level of the regulation schedule. Water supply releases from Lake Istokpoga are halted when water levels fall below 37.5 feet NGVD during the end of the dry season (**Figure 11**). At this point, lake levels are controlled essentially by local rainfall and evaporation. As long as water levels are within the range specified in the regulation schedule, then the minimum needs of water supply, flood control, navigation and ecologic communities are being met and a *no harm* condition prevails.

For navigational and recreational interests, the duration of water levels below 36.5 feet NGVD that leads to *harm* is not clearly defined. Prolonged low water levels impact navigation and recreation, as well as recreation-based businesses along Lake Istokpoga, by limiting access to lake resources (**Table 19**). Under the current regulation schedule (**Figure 11**), these effects are usually temporary and occur only when a controlled drawdown is conducted to enhance shoreline vegetation communities.

A *significant harm* condition for Lake Istokpoga is based primarily on impacts to the lake's biological communities that last more than two years. Based on examination of technical information, the definition of *significant harm* for Lake Istokpoga is as follows:

> Significant harm is defined to occur to the Lake Istokpoga system when surface water levels fall below 36.5 feet NGVD for 20 weeks (140 days) or longer within a calendar year, more frequently than every four years.

Periodic low water events can provide important environmental benefits to the lake's resources (FWC 2000, 2002), but more-extreme or frequently recurring low water events could potentially have longer-term (>2 years) impacts to littoral zone wetlands, wildlife, and recreation and navigation opportunities, as well as to the local economy. This *significant harm* definition is intended to address three important aspects of a defined low water event on Lake Istokpoga's resources: 1) the definition of a low water event (that is, levels must fall below 36.5 feet), 2) the maximum duration of an event and 3) the maximum return frequency of an event. The rationale for each criterion is provided below.

Rationale for Proposed Criteria

The maximum duration of a low water event was defined on the basis of experience gained from the 2001 drawdown. The 2001 event allowed biologists to observe and document impacts to lake resources and to monitor the time required for these resources to recover to a "pre-drawdown" condition. Biological data collected before and after this event were unable to document a clear impact to fish resources that lasted more than 2 years. During the two years immediately after the drawdown, sport fish catches and catch rates were roughly comparable to pre-drawdown levels (**Tables 13, 14, 15**) and fish sampling data indicated a healthy community (**Figures 20, 21, 25)**. This drawdown also allowed chemical and mechanical hydrilla control, restoration and enhancement of littoral zone wetlands, and removal of accumulated organic sediments, which improved lake vegetation communities and water quality. The magnitude and duration of this drawdown event were comparable to those of naturally occurring low water events experienced before implementation of the regulation schedule (**Figure 16** and **Table 18**). On the basis of this knowledge, the point at which a low water event would cause *significant harm* to the system would be when water levels fall below 36.5 feet for a period longer than the 19-week duration of the 2001 drawdown.

The return frequency of drawdown events (once every four years) was based on consideration of the related requirements of wetland vegetation hydroperiods and fish reproductive success. The current wetland communities residing along Lake Istokpoga range from hardwood and cypress swamp on higher sites to littoral zone wetlands on mesic (medium water requirements) sites to submerged aquatic beds near the shoreline (**Figure 18**). When lake water levels fall below 36.5 feet NGVD, the following occurs: 1) the water table is more than three feet below the soil surface in lake swamp communities, 2) and water levels are near the soil surface in littoral wetlands, exposing submerged aquatic vegetation (SAV) at the shoreline. Typically, deepwater marsh communities have average annual hydroperiods of 10 to 12 months (**Table 20**), while submerged aquatic vegetation beds are always inundated, except during severe drought conditions. If low water events occur more often than once every four years, the annual average hydroperiod for existing lake wetlands may be reduced below the typical range for these community types. When lake levels fall below 36.5 feet NGVD, there is no surface water within the littoral zone marsh, which is an important habitat for fish spawning and juvenile-fish foraging. If extreme low water levels persist throughout the fish spawning season, a year-class of fish may be affected. An impact to two such year-classes within a

several-year period would potentially cause multiyear impacts to fish populations. To allow a full recovery of the fisheries resource and a full year of successful reproduction of the restored fish population, a four-year maximum return frequency is proposed to protect the fisheries resource of Lake Istokpoga from *significant harm*.

Basis of Proposed Criteria

Proposed minimum level criteria for Lake Istokpoga are linked to the concept of protecting valued ecologic components from *significant harm*. The specific ecologic resources identified for Lake Istokpoga are wetlands (aquatic beds, marshes and swamps) and their associated fish and wildlife communities. The ecologically and economically important fish and wildlife resources of Lake Istokpoga depend on healthy wetland communities as sources of food, spawning sites, nursery areas for juveniles, nesting sites, shelter and protection, as well as other habitat values. These wetlands also provide other important functions, such as water quality improvement and stabilization of shorelines.

It is recognized that the currently available ecological data may not be sufficient to understand fully the impacts or benefits of low water events. The criteria proposed in the present report are offered as an initial step in defining the point at which *significant harm* may occur, but additional studies may be needed through time to understand ecological functions better and to refine the criteria. A strategy of adaptive management (described later) provides the means to examine new information periodically and to adjust the MFL criteria, if indicated.

Protection from *Significant Harm*

During very dry periods or a managed drawdown, prolonged low water conditions may occur that lead to *significant harm*. No such events caused by low rainfall or drought have occurred in the years since the implementation of the Lake Istokpoga Regulation Schedule, but determination of the point of *significant harm* may be a useful guide for future lake management if demands for water increase.

Technical Criteria

Based on the foregoing information, SFWMD staff proposes the following MFL criteria for Lake Istokpoga:

> A MFL violation occurs within Lake Istokpoga when surface water levels fall below 36.5 feet NGVD for 20 or more weeks within one calendar year, more often than once every four years.

The proposed minimum level for Lake Istokpoga is based on the assumption that *significant harm* can occur to the lake's ecologic resources when water levels fall below 36.5 feet NGVD for the period specified. The MFL criteria are intended to address low water levels resulting from regional drought conditions and/or from withdrawals of water from the lake or adjacent aquifers.

Ability to Meet Proposed Criteria

Analysis of the current regulation schedule and a review of operational policies for Lake Istokpoga indicate that the proposed minimum level criteria will be met under current conditions and for the foreseeable future. Furthermore, the proposed criteria are not expected to affect navigation, recreation, water supply or natural systems since the criteria are well below the current operating schedule for the lake (**Figure 11**). Potential exceedances of these criteria would occur only during a controlled drawdown event. But periodic drawdowns of the lake below 36.5 feet NGVD, as conducted during 2001 by the FWC, are beneficial to the lake and may be required as part of an overall lake management strategy. It is recognized that under certain circumstances, it may be necessary to conduct controlled drawdowns of magnitudes or frequencies that exceed the proposed MFL criteria, in order to enhance the lake's ecologic resources.

The MFL statues and rules do not provide the authority or the legal basis to require that low water events occur. The MFL does provide guidelines 1) as to the magnitude and duration of drawdown events that may occur without causing long-term damage to the resource and 2) as a means to ensure that such damaging low water events do not occur as a result of consumptive use withdrawals. The MFL criteria do not restrict the ability of the SFWMD, FWC and FDEP to lower lake levels as deemed necessary for aquatic weed control, fisheries management, shoreline enhancement or dredging of navigation channels.

Monitoring Strategy

Over the past decades, the SFWMD has continuously monitored water levels at several stations in Lake Istokpoga (**Table 16**). The same stations can be used to track MFL exceedances within the lake. Since implementation of more-conservative water management efforts after 1985, extreme low water events (<36.5 feet NGVD) have occurred only during a managed drawdown event. Furthermore, future low water events are anticipated to occur only under controlled conditions for purposes of environmental enhancement.

During the 2001 vegetation enhancement project, the FWC and the SFWMD carried out biological and hydrologic monitoring, which was required as part of the Environmental Impact Statement and permit from the USEPA. Future managed drawdown events could provide opportunities to conduct pre- and post-drawdown biological and hydrologic monitoring and to measure further the impact of low water events on Lake Istokpoga's resources. The FWC conducts fish catch surveys (**Tables 11, 12, 13, 14, 15)** and performs estimates of the extent of hydrilla in the lake each year. In addition, the distribution of major littoral zone communities is monitored by the FDEP and FWC to gauge the success of ongoing vegetation enhancement projects. These efforts provide a broad range of monitoring data that can be used to address directly the question of low water events' impact on the resource.

It is recommended that vegetation monitoring associated with controlled drawdown events include more emphasis on the multiyear responses of fringing wetland vegetation, especially cypress communities, to low water levels. The current monitoring programs could be expanded or enhanced to incorporate the proposed MFL wetland resource protection concerns.

Prevention Strategy

Since the proposed *significant harm* criteria are not presently being exceeded, a MFL Recovery Strategy (Section 373.0421[2], F.S.) does not need to be developed to protect the resource. Furthermore, under the current operational plan and regulation schedule, *significant harm* to the water body is not expected to occur in the near future, and a MFL Prevention Strategy (Section 373.0421[2], F.S.) is not required.

Low water events play an important role in the overall health of the lake ecosystem, and other projects are planned that may address some of the related issues. These projects include the potential for a reservoir in the Indian Prairie area south of the lake, which may allow more flexibility in the regulation schedule. The Lake Okeechobee Watershed CERP Project will evaluate the existing regulation schedule and will recommend changes to enhance the lake's biological resources for long-term management.

Research Recommendations

The SFWMD and FWC are actively involved in monitoring biological and hydrologic parameters both before and after controlled drawdown events. The SFWMD should continue this partnership with the FWC so that the goals of both projects (the MFL and the environmental enhancement project) are met. Currently birds, fish, and aquatic and littoral zone vegetation communities are being monitored, as well as water quality and lake water levels.

Additional recommended research parameters that could be included in future studies include the following:

- Better monitoring of stream inflow and water use in stream basins.
- Increased attention to groundwater and surface water interactions.
- Further study of evaporation rates on Lake Istokpoga.
- Better understanding of a water budget for Lake Istokpoga.
- Improved understanding of the hydrologic needs for a sustainable fringing lake swamp (bald cypress and mixed hardwood).

Adaptive Management

The proposed minimum level criteria are based on best available information with the understanding that more information is needed in order to refine assumptions used in criteria development. Ongoing and proposed research and monitoring efforts in the Lake Istokpoga watershed will continue to provide more information to improve our understanding of the lake's resources. This information will provide SFWMD staff an opportunity to reevaluate the proposed criteria and to refine the MFL in accordance with regional water supply plan development and implementation activities.

The Lake Okeechobee Watershed Project, a part of the CERP, may potentially affect regulation of water levels in Lake Istokpoga. This project will reevaluate and recommend changes to the Lake Istokpoga Regulation Schedule and will examine the need for additional water storage facilities in the watershed. If significant changes to lake management occur that may require reevaluation of MFL criteria based on new information or altered operational criteria, such changes will be considered in the next Lake Istokpoga MFL update, which is scheduled for 2010, or sooner if significant changes to lake management are proposed.

The criteria developed in the present document should be used as the basis for SFWMD rule development and to evaluate the potential effects of implementation of policy recommendations from watershed planning studies (including modeling). In the issuance of consumptive use permits in the Kissimmee Basin Planning Area, the proposed water use increases should be monitored in terms of their potential individual and cumulative impact on the observance of the MFL guidelines. Current research and monitoring efforts by the SFWMD, FWC, FDEP and local entities should continue, and additional research and monitoring efforts are suggested as a means to provide useful data for refinement of MFL criteria. Monitoring programs associated with drawdown and ecologic enhancement projects are recommended to include an enhanced focus on wetland monitoring that is consistent with the needs of gauging *harm* and *significant harm* to these resources.